IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of	Atty. Docket
GEERT F.G. DEPOVERE ET AL.	PHN 17,772
Serial No.: 09/716,907	Group Art Unit: 2131
Filed: November 20, 2000	Examiner: Arezoo Sherkat

Title: WATERMARK EMBEDDING AND DETECTION

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Enclosed is an original copy of an Appeal Brief in the above-identified patent application.

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Respectfully submitted,

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APPEAL BRIEF

This is an appeal from the Examiner of Group 2131 finally rejecting claims 1-11 in this application.

(i)   Real Party in Interest

The real party in interest in this application is U.S. PHILIPS CORPORATION by virtue of an assignment from the inventors recorded on February 12, 2001, at Reel 11521, Frames 0779-0780.

(ii)   Related Appeals and Interferences

There are no other appeals and/or interferences related to this application.

(iii)   Status of the Claims

Claims 1-11 stand rejected by the Examiner. Appellants are appealing the rejection of claims 1-11.

(iv)   Status of Amendments

A Response under 37 C.F.R. 1.116 was filed on July 20, 2004, after final rejection of the claims June 28, 2004, this Response having been considered by the Examiner.

(v)   Summary Of Claimed Subject Matter

The subject invention concerns watermarking an information signal so that the authenticity of the information signal can be verified, thereby preventing counterfeiting of the information signal. Watermarking consists of adding a watermark pattern to, for example, a video signal. A watermark detector correlates the same pattern with a suspect signal. If the correlation exceeds a given threshold, the pattern is said to be present and the suspect signal is deemed valid.

The process of correlating watermark patterns requires the watermark detector to have locally stored version of all the patterns being used by watermark encoders. As such, it is desirable that only a few different patterns be employed, and these patterns be kept secret to the outside world. However, while a hacker may not know the patterns, if the hacker acquires a relevant watermark

embedder, the hacker merely needs to feed an arbitrary input signal into the embedder and subtract the input signal from the resulting watermarked signal to retrieve the watermark pattern.

The subject invention seeks to provide a more secure method and arrangement for embedding and detecting a watermark, by making the watermark pattern dynamic.

Claims 1 and 9 claim a method of embedding a watermark and a watermark embedder, while claims 5 and 10 claim a method of detecting a watermark and a watermark detector. In particular, as described in the Substitute Specification on page 5, paragraph [0015], and shown in Fig. 1, an input signal I is applied to one input of an adder 11. The input signal is also applied to an image analyzer 12 which analyzes a given property P of the video signal as a function of time. The actual value of the property P is applied as a selection control to a selector 13. A read-only memory 14 has stored therein a plurality of watermark patterns W_1 - W_N, and is coupled to selection inputs of the selector 13. Based on the value of P, the selector 13 selects one of the watermark patterns W_1 - W_N which is then applied to a second input of adder 11. An output of adder 11 then carries the watermarked signal.

(vi)   <u>Grounds of Rejection to be Reviewed on Appeal</u>

(A)   Whether the invention, as claimed in claims 1, 2, 4-6 and

            8-10, is anticipated, under 35 U.S.C. 102(b), by U.S.

            Patent 5,933,798 to Linnartz.

(B)   Whether the invention, as claimed in claims 3 and 7, is

            unpatentable, under 35 U.S.C. 103(a), over Linnartz in

            view of U.S. Patent 5,260,648 to Brust.

(C)   Whether the invention, as claimed in claim 11, is

            unpatentable, under 35 U.S.C. 103(a), over Linnartz in

            view of U.S. Patent 6,510,233 to Nakano.

(vii)   <u>Arguments</u>

(A)   The Linnartz patent discloses detecting a watermark

embedded in an information signal, in which the embedding of a

watermark is described with reference to Fig. 1 therein. In

particular, "The arrangement comprises a watermark data signal

generator 11 which generates a predetermined watermark data signal

$w_i(n)$ for each watermark W_i." (col. 2, lines 18-21). As described at

col. 2, lines 15-18, "The watermark can be a code which uniquely

identifies the owner of the copyright. It can also be a text string

or simply a binary coded number. Accordingly, there is a finite set

of different watermarks W_i." As should be apparent from examining

Fig. 1, the particular watermark W_i used in watermarking the image

signal $p(n)$ is pre-selected and applied to the watermark data

signal generator 11, which generates the associated watermark data signal which is added to the image signal p(n) in adder 12.

It has been well established that "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).

(1)   <u>Claims 1 and 9</u>

In the subject invention, as claimed in claims 1 and 9, a given property of the information signal to be watermarked is analyzed and an actual value of the given property is determined. In addition, different watermarks in a plurality of watermarks are associated with distinct values of the given property. Finally, the watermark from the plurality of watermarks which is associated with the actual value of the property is selected for watermarking the information signal. A result of this is, over the course of time, the embedded watermark changes, and as such, a plurality of watermarks are used, depending on the actual value of the given property of the information signal.

Appellants submit that Linnartz neither shows nor suggests analyzing a property of the information signal in order to determine which one of a plurality of watermarks is to be used to watermark the information signal. In fact, Linnartz neither shows nor suggests analyzing an information signal to be watermarked at

all for any purpose. Rather, Linnartz only applies a single
watermark for each image signal p(n).

In response to these arguments, the Examiner states
"Linnartz discloses the luminance of the selected pixels p(n) of
the video image is added to a watermark data value (Col. 2, lines
1-67 and Col. 3, line 1-67)."

What the Examiner is stating is true, but it has nothing
to do with the subject invention. In particular, this section of
Linnartz describes the effects that watermarking with each of two
different watermarks W_1 and W_2 have on a hypothetical video image
(note that Linnartz states, at col. 2, lines 64-67, "In the present
example, the video signal is <u>assumed</u> to represent a vertical
transition from a luminance value 10 to a luminance value 80. The
range of luminance values p(n) is assumed to be 0-255."), and that
while the watermarked signals show distinct differences both from
each other and from the hypothetical video image, this is not
perceivable by the human visual system. However, again Appellants
stress that Linnartz neither discloses nor suggests analyzing a
given property of the information signal to be watermarked and
determining an actual value of the given property, associating
different watermarks in a plurality of watermarks with distinct
values of the given property, and selecting the watermark from the
plurality of watermarks which is associated with the actual value
of the property, for watermarking the information signal.

(2)   <u>Claims 2 and 6</u>

Claims 2 and 6 recite "analyzing a spatial or temporal distribution of luminance values, each distinct distribution of luminance values constituting a value of said property of the information signal." While Linnartz states "the video signal is assumed to represent a vertical transition from a luminance value 10 to a luminance value 80. The range of luminance values p(n) is assumed to be 0-255." (col. 2, lines 64-67), Appellants submit that there is no analyzing of the image signal p(n) to determine the actual values of the spatial or temporal distribution of luminance values, and there is no association of different watermarks with distinct values of the spatial or temporal distribution of luminance values, and there is no selection of the watermark based on the actual value of the spatial or temporal distribution of luminance values of the information signal.

In response thereto, the Examiner states "Linnartz disclosure is in spatial domain (Col. 2, lines 1-10 and Col. 2, lines 64-67)."

Apparently, the Examiner does not understand what is being claimed in claims 2 and 6. In particular, claims 2 and 6 do not merely state that the watermarking is being performed in the spatial domain. Rather, claims 2 and 6 specifically recite "analyzing a spatial or temporal distribution of luminance values, each distinct distribution of luminance values constituting a value

of said property of the information signal." The noted sections of Linnartz merely state that the example being described in Linnartz is of a watermark embedded in the spatial domain, and an assumed luminance distribution of a hypothetical video signal, and how the assumed luminance distribution changes with the separate application of two different watermarks. Appellants stress that there is no disclosure in Linnartz of the limitations as claimed in claim 2.

(3)   <u>Claims 4 and 8</u>

Claims 4 and 8 recites "each embedded watermark is a combination of two or more basic watermark patterns constituting a set of basic watermark patterns, said set of basic watermark patterns being selected from different sets of basic watermark patterns in dependence upon the actual value of the property of the information signal." While Linnartz, at col. 2, line 39 to col. 3, line 35, describes, as an example, two different watermarks W_1 and W_2, and how the video signal would be differently affected by the different watermarks W_1 and W_2, Appellants submit there is no disclosure in Linnartz that these two watermarks form a set of basic watermark patterns, that these two watermarks are combined (as basic watermark patterns) to form an embedded watermark, and that the set of basic watermark patterns is selected from different sets of basic watermark patterns in dependence upon the actual value of the property of the information signal.

In response to the above, the Examiner states "Linnartz discloses that the luminance value p(n), and watermark data value wi(n), are added by an adder pixel by pixel (Col. 2, lines 1-67)."

Again, Appellants stress that this has nothing to do with the invention, and particular, with the limitations as claimed in claim 4.

(4)   Claims 5 and 10

With regard to claims 5 and 10, Linnartz discloses watermark detectors (with reference to Figs. 2-4) in which a watermarked input signal is multiplied by watermark data generated using a selected watermark, subjected to a summation in summation circuit 23 and evaluated in evaluation circuit 24 (Fig. 2, col. 3, line 35 to col. 4, line 26), the watermarked input signal and the watermark data are filtered in respective predictive filters 25 and 26 prior to multiplication (Fig. 3, col. 4, line 27 to col. 6, line 12), and the watermarked input signal is conditioned in pre-filters 41, each pixel in the input signal is multiplied by a weighting factor in multipliers 42, the products are summed in a summation circuit 44, the summation being evaluated in evaluation circuit 24, wherein the weighting factors applied to the multipliers 42 are generated by a weighting factor calculating circuit 44 to which a watermark is applied (Fig. 4, col. 6, lines 13-23).

However, Appellants submit that there is no disclosure or suggestion in Linnartz of "analyzing a given property of the

information signal and determining an actual value of said property", "associating different watermarks in a plurality of watermarks with distinct values of said property", nor of "selecting and detecting the watermark from said plurality of watermarks associated with said actual value" as specifically claimed in claims 5 and 10. In particular, in the watermark detector embodiments of Linnartz, the watermarked signal and a selected one of the watermarks are processed together, and the results are correlated forming a correlation amount. As described at col. 6, lines 24-28, "In summary, a watermark embedded in an information signal is detected by correlating said information signal with a plurality of watermarks $Wj(n)$. The respective amounts of correlation $C(i,j)$ are then evaluated to determine the watermark embedded in the signal $xi(n)$." Hence, Appellants submit that Linnartz neither shows nor suggests "analyzing a given property of the information signal and determining an actual value of said property", "associating different watermarks in a plurality of watermarks with distinct values of said property", and "selecting and detecting the watermark from said plurality of watermarks associated with said actual value".

(B)   The above arguments concerning Linnartz are incorporated herein. The Brust patent discloses a process and system for rapid analysis of the spectrum of a signal at one or several points of

measuring, in which, arguably, the shape of a frequency spectrum of an audio signal is detected.

Appellants submit, however, that the combination of this feature with Linnartz is meaningless with respect to the subject invention, in that neither Brust nor Linnartz disclose or suggest that this should be the property of the input signal to be analyzed, "associating different watermarks in a plurality of watermarks with distinct values of said property" and "selecting the watermark from said plurality of watermarks associated with said actual value for embedding in the information signal".
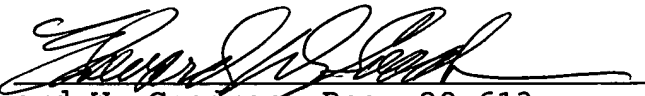
(C)   The above arguments concerning Linnartz are incorporated herein. The Nakano patent discloses an electronic watermark insertion device which includes a watermark detector for detecting whether a watermark to be inserted into a signal has already been inserted into the signal.

However, Appellants submit that Nakano does not disclose a watermark detector having the enumerated elements as claims in claim 11. Further, Appellants submit that Nakano does not supply that which is missing from Linnartz, i.e., "associating different watermarks in a plurality of watermarks with distinct values of said property" and "selecting the watermark from said plurality of watermarks associated with said actual value for embedding in the information signal".

Based on the above arguments, Appellants believe that the subject invention is neither anticipated nor rendered obvious by the prior art, either individually or collectively, and as such, is patentable thereover.

Therefore, Appellants respectfully request that this Board reverse the decisions of the Examiner and allow this application to pass on to issue.

Respectfully submitted,

by _____
Edward W. Goodman, Reg. 28,613
Attorney

CERTIFICATE OF MAILING

It is hereby certified that this correspondence is being deposited with the United States Postal Service as first-class mail in an envelope addressed to:

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On _Nov. 10, 2004_

By _Burnett James_

(viii)   Appendix

CLAIMS ON APPEAL

1. (Previously Presented) A method of embedding a watermark in an
information signal, comprising the steps:

      analyzing a given property of the information signal and
determining an actual value of said property;

5   associating different watermarks in a plurality of
watermarks with distinct values of said property; and

      selecting the watermark from said plurality of watermarks
associated with said actual value for embedding in the information
signal.

2. (Previously Presented) The method as claimed in claim 1, in
which the information signal is a sequence of video images, and
said analyzing step comprises:

      analyzing a spatial or temporal distribution of luminance
5 values, each distinct distribution of luminance values constituting
a value of said property of the information signal.

3. (Previously Presented) The method as claimed in claim 1, in
which the information signal is a sequence of audio signal
segments, and said analyzing step comprises:

analyzing a shape of the frequency spectrum of said audio

5   segments, each distinct shape of the frequency spectrum

constituting a value of said property of the information signal.

4.   (Previously Presented) The method as claimed in claim 1, in

which each embedded watermark is a combination of two or more basic

watermark patterns constituting a set of basic watermark patterns,

said set of basic watermark patterns being selected from different

5   sets of basic watermark patterns in dependence upon the actual

value of the property of the information signal.

5.   (Previously Presented) A method of detecting a watermark in an

information signal, comprising the steps:

analyzing a given property of the information signal and

determining an actual value of said property;

5   associating different watermarks in a plurality of

watermarks with distinct values of said property; and

selecting and detecting the watermark from said plurality

of watermarks associated with said actual value.

6.   (Previously Presented) The method as claimed in claim 5, in

which the information signal is a sequence of video images, and

said analyzing step comprises:

analyzing a spatial or temporal distribution of luminance

5   values, each distinct distribution of luminance values constituting

a value of said property of the information signal.

7.   (Previously Presented)   The method as claimed in claim 5, in

which the information signal is a sequence of audio signal

segments, and the method further comprises the step:

calculating the frequency spectrum for each segment, each

5   distinct shape of said frequency spectrum constituting a value of

said property of the information signal.

8.   (Previously Presented)   The method as claimed in claim 5, in

which each embedded watermark is a combination of two or more basic

watermark patterns constituting a set of basic watermark patterns,

said set of basic watermark patterns being selected from different

5   sets of basic watermark patterns in dependence upon the actual

value of the property of the information signal.

9.   (Previously Presented)   A watermark embedder for embedding a

watermark in an information signal, comprising:

means for analyzing a given property of the information

signal and determining an actual value of said property;

5   means for associating different watermarks in a plurality

of watermarks with distinct values of said property; and

means for selecting the watermark from said plurality of watermarks associated with said actual value for embedding in the information signal.

10. (Previously Presented) A watermark detector for detecting a watermark in an information signal, comprising:

means for analyzing a given property of the information signal and determining an actual value of said property;

5   means for associating different watermarks in a plurality of watermarks with distinct values of said property; and

means for selecting and detecting the watermark from said plurality of watermarks associated with said actual value.

11. (Previously Presented) The watermark embedder as claimed in claim 9, wherein said watermark embedder further comprises:

a watermark detector for detecting a watermark in an information signal, comprising:

5   means for analyzing a given property of the information signal and determining an actual value of said property;

means for associating different watermarks in a plurality of watermarks with distinct values of said property; and

means for selecting and detecting the watermark from said
10 plurality of watermarks associated with said actual value; and

means for refraining from embedding the selected watermark

in response to said watermark detector detecting said selected

watermark in the information signal.